

Overview of ASHRAE STANDARD 52.2

Research Triangle Institute

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What is ASHRAE?

ASHRAE, the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., is an international organization with 50,000 members. Its sole objective is to advance through research, standards writing and continuing education the arts and sciences of heating, ventilation, air conditioning and refrigeration to serve the evolving needs of the public. (Courtesy of ASHRAE)

What is ASHRAE Standard 52.2?

ASHRAE Standard 52.2 entitled "Method of Testing General Ventilation Air Cleaning Devices for Removal by Particle Size" is a standardized laboratory test method for measuring the filtration efficiency of ventilation air filters used in residential and commercial buildings.

What type of filters will be tested by Standard 52.2?

All types of ventilation filters used in general residential and commercial ventilation will be tested. This includes residential furnace filters, pleated panel filters common in commercial applications, and high capacity bag filters.

Electronic air cleaners, although not specifically excluded by the method, may not be compatible with the dust loading portions of the method. Also, the method does not apply to industrial air cleaners (such as cyclones, mist eliminators, and bag houses), and does not include self-contained room air cleaners or devices such as ozone generators and ionizers.

How are the tests performed?

The test filter, typically having face dimensions of 24" by 24", is placed in a test duct. The airflow in the duct is set at a constant value from 500 to 3,000 cfm depending upon filter type. A test aerosol is then injected upstream of the filter while a particle counter is used to count the number of particles upstream and downstream of the filter in 12 size ranges from 0.3 - 10 μm diameter. The ratio of the downstream counts to the upstream counts is used to compute the filtration efficiency for each of the 12 channels.

Why does the test use the 0.3 - 10 μm size range?

This size range encompasses the upper end of the respirable size range -- a range where ventilation air filters can be effectively applied to control the concentration of these airborne particles.

Why is a new method needed?

Prior methods (e.g., ASHRAE 52.1) were designed to evaluate filters for their ability to protect HVAC equipment from dust (e.g., the way a furnace filter keeps large dust and lint off of the furnace's heat exchanger surfaces) and to prevent staining on air diffusers, ceilings and walls. These tests were not aimed at evaluating a filter relative to its ability to filter respirable size particles.

How did the method come about?

ASHRAE began its development efforts in 1987. In 1991 ASHRAE awarded RTI a research contract to review test methodologies and recommend approaches for

particle-size efficiency date. The research project was completed in 1993. ASHRAE Committee SPC 52.2P was then formed to draft the standard.

During this same period, EPA awarded a Cooperative Agreement to RTI to measure the efficiency of ventilation filters and to build and validate a test duct for the testing.

What's the status of the new method?

The third public review period was completed 6/10/97. The ASHRAE SPC 52.2 Committee will meet later this month to review comments submitted. The final standard is expected in about 6 months, but this could change based on the third public review comments. ASHRAE endeavors to obtain consensus and resolution of all review comments.

Will Standard 52.2 rank filter performance?

Yes. Based on the filtration efficiency results and final pressure drop of the filter, the filter receives an MER value.

What is MER?

MER is the "Minimum Efficiency Reporting" value for a filter. It is based on the minimum efficiencies observed during the test of the filter.

Why is MER important?

It tells the consumer the minimum he can expect from the filter. That way, he is always assured of getting at least that level of performance.

What impact will the 52.2 test method have?

Hopefully, with the new test results, a customer will have a clearer representation of filter performance.

Is dust loading included in the test?

The filters are tested in their clean condition and after five levels of dust loading. This is done because filtration efficiency changes as dust accumulates on the filter during use.

How is data reliability and accuracy assured?

The method includes a set of comprehensive qualification tests and data quality checks so that you can be assured that all reported test results meet the same high levels of data quality.

How many labs perform 52.2 tests?

RTI and several other labs are gearing up to perform the test once it is standardized.

What role will Environmental Technology Verification (ETV) Program play?

The objectives of the ETV program are to facilitate implementation of the 52.2 test method and to use the method to verify performance claims of the industry. The exact means of doing this are still under discussion but, the ETV program may:

1. Prepare and compile test-method validation documents.
2. Conduct inter-laboratory pilot studies to assess reproducibility.
3. Develop the frame work of a laboratory proficiency program to assure data comparability as new test laboratories come on-line.

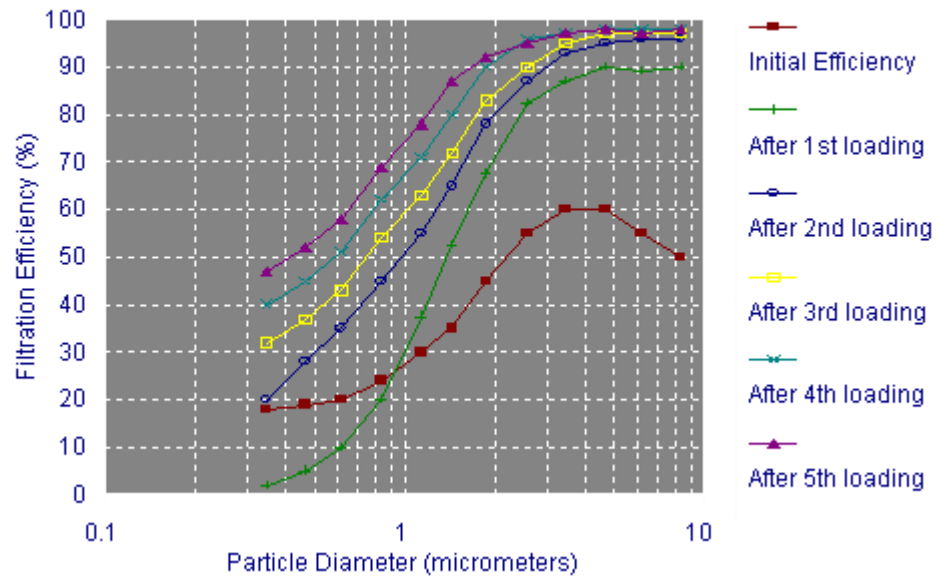
4. Investigate modifications to the 52.2 method that might further increase the utility of the method (for example: evaluate other loading dusts, assess impact of different particle counters on measured efficiency, evaluate adequacy of the method for electrostatically-charged fiber filters, and investigate modification to allow testing of electronic air cleaners).
5. Prepare verification statements or test reports for filters submitted and/or selected for testing under the ETV program.
6. Share information gained on this program relative to Standard 52.2 with the cognizant ASHRAE and NAFA committees.
7. The ETV program is limited to one-time testing ("verification") and can provide the basis for long term programs ("certification") under consideration by NAFA and others.

What does a ASHRAE Standard 52.2 test report look like?

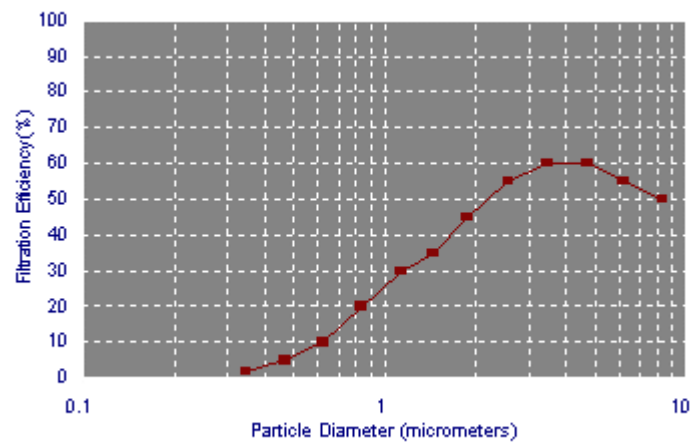
The following table and graphs make up a sample Air Cleaner Performance Report.

ASHRAE Std. 52.2P				Page 1 of 4	
Air Cleaner Performance Report Summary					
Laboratory Data:					
Report No.	96-392	Test No.	96-1798	Date	Dec. 12, 1996
Test Laboratory Independent Test Lab., Inc.					
Operator	John Doe	Supervisor	J. Smith		
Particle Counter Brand	Countall	Model	ABC	Calib	10-1-96
Device Manufacturer's Data:					
Manufacturer	Filtermaker, Inc.				
Product Name	Flo-Rite	Model	12		
Test requested by Filter Sales Co.					
Sample obtained from Manufacturer					
Catalog rating: Airflow	1.5 m/s	Initial ΔP	65 Pa		
Specified test conditions:		Face Velocity	1.5 m/s (295 FPM)		
		Final ΔP	250 Pa		
Device Description:					
Dimensions Height	610 mm	Width	610 mm	Depth	40 mm
Generic name	Pleated Panel Filter	Media type	Synthetic		
Effective media area	0.5 m ² (estimated)	Media color	White		
Amount and type of adhesive None					
Other attributes					
Test Conditions:					
Face Velocity	1.5 m/s	Temperature	20C	RH	40%
Test aerosol type	Potassium Chloride	Generation rate	NA		
ASHRAE Loading Dust weight	NA	Feed rate	2 g/min		
Type B device service life NA					
Remarks					
Resistance Test Results:					
Initial resistance	62 Pa	Final resistance	250 Pa		
Minimum Efficiency Reporting Value Information:					
Composite average efficiencies	E ₁ 9	E ₂ 41	E ₃ 56		
Coarse air cleaner average Arrestance per Std. 52.1 NA					
Minimum Efficiency Reporting Value MER 7 / 1.5 m/s					

Initial and Dust Loaded Efficiencies MER 7



MER Minimum Composit Curve



Airflow Vs. Resistance

